

## **Chapter 2**

# **Railway Train Operations**

There are many hazards that exist during railway train operations. The following have always been hazards of railway operations:

- Human errors.
- Recklessness.
- Mechanical failures.
- Collisions.
- Wrecks.

### **OPERATING AND SAFETY RULES**

2-1. The design of operating rules to prevent these hazards has been formulated gradually. There are now rules to cover all situations, which conceivably present a potential accident hazard. These rules, published in the "Standard Code" by the Association of American Railroads, are the basis for nearly all railroad rules currently used in the US. Many railroads have altered the rules slightly or dropped those that do not apply to them due to local conditions and types of operations. However, the rule numbers have not changed. For instance, Rule 99 means the same thing to railroaders in California as to those in Connecticut. All railroads have also developed safety rules. While safety rules do not have the general uniformity of operating rules, they are similar in that they prohibit dangerous practices and prescribe safety procedures. See FM 55-21 for detailed explanations of these rules.

### **OPERATING RULES**

2-2. Train operations are governed by current railway operating rules adapted from the Standard Code of Train Rules issued by the Association of American Railroads. These rules are modified to meet military railway requirements and are published in FM 55-21. The battalion commander must ensure that all operating personnel have a copy of the timetable and be familiar with the operating rules. Periodic examinations are given to ensure that personnel completely understand the rules. Personnel must always obey operating and safety rules.

2-3. Do not randomly use vehicles equipped with road-rail devices on railroad tracks or without proper authority from the train dispatcher. When a vehicle equipped with a conversion device operates on the tracks of a railroad that is under the supervision of the rail unit, it constitutes a train and must be considered as such. Operate such a vehicle according to FM 55-21.

## **SAFETY RULES**

2-4. Railway shops, yards, and trains have always been places of potential personal injury and property damage. Safety rules simply requires applying common sense precautions when performing duties in hazardous surroundings.

### **Safety Conditions**

2-5. The following are only a few of the changes that has eliminated many conditions that once caused injury and death on the railroad:

- Automatic couplers.
- Electric signals.
- Rolling-stock improvements (steps, grab irons, running boards, and so forth).
- Use of diesel motive power instead of steam.

On many foreign railroads, safety conditions and safety devices vary considerably from the standards of US railroads. In many foreign countries there is not enough clearance on bridges, buildings, tunnels, and overhead lines and obstructions for personnel riding the tops and sides of cars. There is also a lack of uniformity in the safety devices (such as the number and location of grab irons, ladders, sill steps, braking devices, and couplers). These conditions require a constant watch by rail personnel unaccustomed to them.

### **Accidents**

2-6. Many accidents are caused by people from outside agencies who have not had the safety training given to rail personnel and/or who ignore posted warnings and all rules of common sense. Some common examples of accidents are those resulting from the following:

- Other agencies mishandling dangerous articles into and out of cars on railroad premises.
- Improper loading of dangerous material.
- Vehicles loaded with explosives.
- Flammables crashing into locomotives and trains at crossings.

Extensive safety campaigns, safety rules, and supervisory discipline have helped. However, the human factor still remains and injuries and deaths do occur.

### **Warning Signs**

2-7. The design of warning signs and labels is to prevent accidents. Railway personnel must think and live safety. Applicable safety rules are in FM 55-21. Members of rail units must know and obey these rules. Supplementary instructions are issued for unusual situations as required. SAFETY IS EVERYONE'S RESPONSIBILITY-ALL THE TIME.

### **COMMUNICATIONS SYSTEM**

2-8. The railway communications system consists of two major parts. The first part is for the efficient operation of the railways. The second part is for routine administration, communication, and logistical purposes. The second part is connected to all rail units, including transportation railway operating battalions and lateral and higher HQ. The rail communications system normally consists of two pairs of open wire pole lines for telephone and teletype circuits. You may use radio relays (see paragraph 2-13) before wire lines are rehabilitated or established in an overseas theater of operation.

### **TRAIN DISPATCHER'S CIRCUIT**

2-9. The train dispatcher, station operators, and tower men, mainly use this circuit. Its use is for the control of trains by train order, block signals, and special instructions issued by the train dispatcher. A terminal operator not only controls trains entering the terminal from his own division, but he also receives and releases trains to the adjacent dispatcher in the connecting division. He also coordinates all train movement responsibilities between connecting divisions for the dispatcher concerned. The train dispatching circuit has a selective ringing device that permits the dispatcher to call stations separately or simultaneously. The train dispatcher is responsible for strict wire discipline and issues orders and instructions in compliance with the rules for movement of trains by train order (see FM 55-21).

### **STATION-TO-STATION CIRCUIT**

2-10. Use this circuit to distribute general information, reports, and records needed for efficient operation. Information obtained must implement orders or instructions issued by the train dispatcher.

### **TELETYPEWRITER CIRCUIT**

2-11. This simplex circuit connects the battalion with adjacent battalions and higher HQ. The circuit transmits operating policies and directives to coordinate the movement of troop, hospital, and VIP trains. It is used at the battalion level to transmit routine matters to higher HQ.

## POLE AND LINE MAINTENANCE

2-12. Planned and continuous preventive maintenance prevents frequent service interruptions (particularly after heavy storms and in areas subject to enemy action or sabotage). Regular patrols are established to detect and correct faulty conditions. The nature and frequency of inspection depend on the age and type of poles and lines and the terrain, weather, and other conditions. Regular inspections can normally be made from the ground. However, pole-top inspections should be made often at points in the line where defects are most likely to develop. Inspection crews are equipped with tools and equipment for making minor repairs and for trimming small branches and vegetation. Unsatisfactory poles, crossarms, and so forth should be replaced.

## RADIO COMMUNICATIONS

2-13. The rail unit may need radio communications during the early stages of an operation. Communications may be required when wire lines are cut down, destroyed, or nonexistent. They are also required when rebuilding or building does not keep pace with the reconstruction of tracks. The communications command, TA installs unit radio-communication facilities. It also assigns call signs, radio frequencies, radio power, and type of emission to be used. Radio communication is normally established only when conditions warrant its use, when wire lines are not available, and when the appropriate commander approves the installation (see FM 55-21). A radio repair team is provided by the communications command, TA. The team is attached to the transportation railway battalion. The repair team supervises installation of radio equipment and maintains it while in use. Such allocation of equipment is on a "when conditions warrant, class IV" basis and is operated by railway battalion personnel. When equipment is made available, the rail unit uses the following three general systems of radio communications.

- Train operational control, en route.
  - Between dispatcher and stations.
  - Between train crew members.
  - Between stations.
  - Between dispatcher and trains (if range is adequate).
  - Between stations and trains.
  - Between crews of different trains.
- Operational control in yards and terminals, yard offices, switch crews, and yard personnel.
- Administrative and technical control.
  - Operating units.
  - Administrative units.

## OPERATION OF TRAINS

2-14. Railroad main line operations are complex. They involve the movement of freight, passenger, and mixed (freight and passenger) trains from one terminal or yard to another over a division or subdivision of track. Adding to the complexity is that rail operations are a prime target of enemy NBC weapons. Contingency plans must be developed with the capability and flexibility to continue operations in an NBC environment. Protective measures and procedures to relieve the effects of NBC weapons must be integrated into daily operations. NBC attacks will create high casualty rates and material losses, as well as contaminate terrain within the unit. Increased levels of MOPP will result in heat buildup; reduced mobility; and reduction of visual, touch, and hearing senses. Rail unit operational efficiency and productivity will be lowered.

2-15. The enemy will use contamination to cause casualties, lower performance, and restrict the use of the terrain. The enemy engages the unit with contamination, hoping that operations will either stop to decontaminate or will avoid using contaminated terrain (rail line segments) or facilities (railheads, yards and terminals, and maintenance/repair shops). If possible, bypass contaminated areas by using alternate rail routes. If train operations cannot be rerouted, operate only the least essential locomotives and railcars through the contaminated area. Cover all items on flatcars, gondolas, and open-top hopper cars with protective tarps. Use containerization to the maximum extent possible. Encapsulating and covering equipment will reduce the amount or eliminate decontamination requirements. Train personnel should be in MOPP gear and be prepared to augment inter-train communications with the use of standard rail operational hand signals. Close all doors and windows to lessen contamination. If the area is contaminated with nuclear radiation, the shielding property of the locomotive can be improved if sandbags are placed on the deck. Take immediate action to determine the type of hazard and its persistency. If the hazard is a nonpersistent blood or nerve agent, the train crew continues its mission. The hazard should disappear quickly. If the hazard is persistent (nuclear fallout, suspected biological agent, or liquid chemical agent), the train crew maintains full protection, takes action to limit further exposure to the hazard, and continues the mission. If possible, once the train is out of the contaminated area, it should be decontaminated before onward movement to prevent the spread of contamination. If hasty decontamination cannot be accomplished, train personnel will remove contamination from all equipment surfaces that must be touched often and mark each railcar with the appropriate NATO NBC marker. Perform deliberate decontamination as soon as practical. Keep a record of each locomotive and railcar to identify the date of contamination, the type of agent, and the date and method of decontamination used. FM 3-100 has more information covering operations in an NBC environment.

2-16. Depending on the phase of operations, the trains operated by the rail unit may be extra or regular trains and may be civilian or military-controlled. A regular train is authorized by timetable while an extra train is authorized by a train order issued by authority of the chief train dispatcher. Road movements are coordinated operations with successful accomplishment depending on the following factors:

- People and facilities provided.
- Adequate functioning equipment.
- Suitable trackage.
- Competent dispatchers, maintenance personnel, and operating crews.

The requirement for adherence to special orders, rules, and other operating instructions are in FM 55-21.

## **TRACK FACILITIES**

2-17. In railway terminology, track facilities are defined as those facilities that are required to operate railway trains at a predetermined safe speed. Track facilities include the following:

- Main tracks.
- Sidings.
- Towers.
- Signals.
- Buildings.
- Fuel/lube, sanding, and water points.
- Shops.
- Enginehouses.
- Communications system.

## **MAIN TRACK**

2-18. The main track is a track that extends through yards and between stations. The timetable, track warrant, train order, or block signals determine its operation. A main track consists of a single track or two or more tracks on which the current of traffic may run in either direction. Figure 2-1 shows the schematic layout of a typical railway battalion's AOR. The following paragraphs discuss the three types of main track operations.

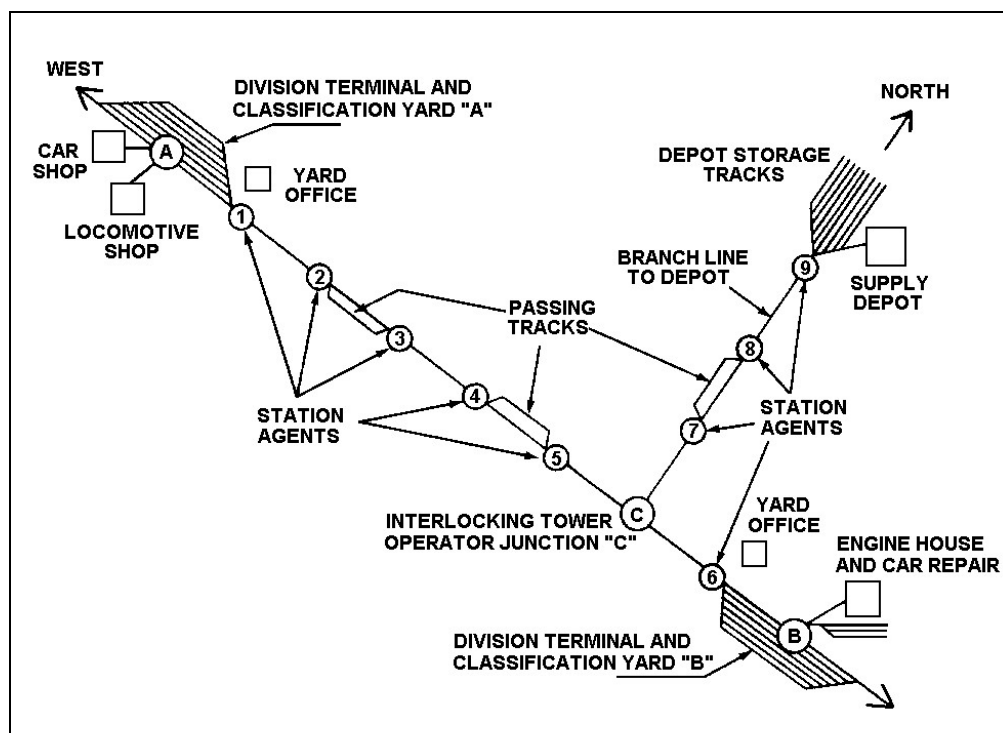


Figure 2-1. Schematic Layout of a Typical Railway Battalion's AOR

2-19. Although a single-track line permits trains to run in opposing directions, provisions for their meeting or passing must be made either by train order or timetable schedule authority. When operating on a single track by the timetable method of train operation, the inferior trains must be in the siding 10 minutes before the scheduled arriving time of the opposing superior train unless otherwise directed by train order. When a train dispatcher authorizes an extra train to run over a single-track rail line, he must make provisions for the new extra train to meet all opposing extra trains en route in the train order authorizing the new extra to run. Single-track railway operation not only requires that all operating personnel know, understand, and comply with all provisions of the operating rules, but that they also strictly comply with all train orders issued by the authority and over the signature of the chief train dispatcher.

2-20. A double-track rail operation consists of two main tracks with the flow of traffic being in the direction specified in the special instructions of the timetable. The train dispatcher has a firm base on which to control scheduled trains. The existence of a double-track rail line operated by timetable authority does not relieve the train dispatcher of the many details inherent in a single-track operation, since only first-class trains are normally listed in a timetable schedule. While the flow of traffic is specified in the timetable, facing and trailing point switches permit the dispatcher to use either track at any time to relieve congestion or interruption on one of the lines.

2-21. Multiple-track operation is found where the train density is great (near and through large transportation centers). Since movement is controlled by towers (as directed by the dispatcher) the flow of traffic is determined by the dispatcher for each train in order to provide greater movement flexibility and track use.

### **SIDING**

2-22. A siding is a track auxiliary to the main track. It is connected by switches at both ends and is used for the purpose of meeting and/or passing trains. To prevent delays when two opposing trains contain a greater number of cars than a siding can accommodate, sidings should be long enough to contain the longest train that can be run over the railway line. NEVER use a siding as a loading and/or unloading point except for a serious interruption to traffic or in an extreme emergency.

### **SPUR**

2-23. A spur is a dead-end track auxiliary to the main track. It is connected to the main track at one end and is used to load and/or unload railway equipment. Spurs used as loading and unloading points must be easily accessible to adjacent roads or highways. When two locomotives "meet" face to face, the spur provides a place for one to get out of the way. However, this operation requires train crews to be very vigilant because the train must be headed out or vice versa.

### **SWITCH**

2-24. A switch consists of moveable rails which can be positioned to allow cars or trains to move from one track to another. Power-operated switches are usually found in busy terminals, at interlocking plants, and in CTC installations on the main line. Manually operated switches are normally equipped with locks for safety purposes (a switch usually is opened to the main track and closed to the spur or siding). The position of a switch is indicated by colored panels or blades by day and lights by night. The universal code has a green aspect for a closed switch and a red aspect for an open switch.



**BRANCH LINE**

2-25. A branch line may be either a double- or single-track railway line connecting main lines. It may also be designed to serve relatively remote places, such as industrial plants or sparsely settled areas. Usually a branch line is constructed of lighter rail and has fewer crossties and poorer ballast than a main line. You may use branch lines during phase I operations to meet military needs until the main lines can be rehabilitated.

**CAR ALLOCATION AND DISTRIBUTION**

2-26. Cars are allocated for loading based on priorities set by TA and other higher HQ. Necessary rolling stock to fill requirements is authorized in the movement program. Movements not included in this program must be specifically authorized on a "spot" or immediate requirement based by appropriate rail unit or logistical command HQ.

**DISTRIBUTION**

2-27. Furnish a copy of the program to the chief dispatcher. He directs the car distributor in issuing orders for the prompt movement of all available empty cars to the loading site or areas to meet movement requirements. For example, there may be a known and constant daily requirement for 10 tank cars to move POL from depot A, 10 boxcars for ammunition from depot B, 10 flatcars for equipment from depot C, and so forth. The car distributor issues these orders based on information he has received from situation, current station or empty car status, train and yard reports, and reports from adjacent divisions. Yardmasters and/or station agents have switching crews place the empty cars for loading according to programmed and authorized nonprogrammed requirements.

2-28. A daily operational and movement conference makes car distribution easier for a port, depot, or other large loading point. Car distribution requirements for the next 24 hours are stated and coordinated with the movement program. The chief dispatcher is responsible for informing the operations superintendent (battalion commander) of the empty car situation and inability to meet loading requirements. In such cases, the changes in priorities are made through movement control channels.

### UNAUTHORIZED USES

2-29. Units, depots, or services must not hoard or be given cars without proper authority. Using railcars for mobile or storage keeps them out of service, upsets the flexibility of car supply, and disrupts the distribution program. Such practices result in confusion and shortage of equipment already committed for other uses. Agents, field transportation officers, yardmasters, and unit personnel must report any unauthorized use or hoarding of rail equipment to higher HQ. The report is then forwarded to the required command level for corrective action.

### RECORDS AND REPORTS

2-30. Records and reports are essential in the unit. The transportation railway battalion, as the basic operating unit, reports the following information to group HQ for relay to logistical planners at all command levels.

- Total tonnages moved.
- Number of empty and loaded cars on hand at midnight.
- Number of serviceable locomotives.
- Delays and interruptions to traffic for the preceding 24 hours.
- Fuel requirements.
- Operational reports required by higher HQ and transportation movement control agencies for daily planning.

The records and reports discussed in this section are typical of those pertaining to the administration, maintenance, and operation of military railways. Space limitations preclude full discussion of all forms used by the unit. Unnecessary paperwork and the accumulation of voluminous reports should be avoided.

### PREPARATION, FORWARDING, AND RETENTION

2-31. Reports are prepared, forwarded, and/or retained according to the SOP of the next highest echelon of command requiring the information. At each echelon, reports are reviewed, information extracted, and consolidated reports prepared and forwarded to the next higher HQ. Reports are forwarded (as applicable) by telephone, teletype, mail, or messenger service. Reports and records prepared or received, particularly those containing personnel and statistical information, are considered as permanent unit records. These records are filed, maintained, and disposed according to instructions issued by the highest unit command echelon.

**DAILY INSTALLATION SITUATION REPORT (DA FORM 5620-R)**

2-32. All rail activities prepare this report (Figure 2-2, page 2-12) at depots, railheads, yards, terminals, ports, or other points where loading, unloading, or movement of cars takes place. They prepare this report at a fixed time each day. This report is completed and consolidated at each level of command. It reflects the situation as of the hour it is compiled and the progress of operations over the preceding 24 hours for the entire division. The report is based on data obtained by a thorough physical check of all yards, stations, depots, docks, warehouses, loading and unloading tracks, or other tracks where cars are stored. The report is then filed as a permanent station record. Appendix A contains a blank copy of a DA Form 5620-R. Instructions for completing this form are also shown in Figure 2-2, page 2-13.

**MAINTENANCE OF WAY REPORTS**

2-33. The transportation railway engineering company prepares maintenance of way reports. These reports cover normal operations in repair and rehabilitation work and are used by the battalion commander and higher HQ. Special reports are promptly made by electrical means on the extent of damage to bridges, buildings, tracks, and tunnels resulting from enemy or guerrilla action, floods, sabotage, slides, wrecks, or other causes. All personnel casualties are reported. If tracks are obstructed, an estimate is made as to the time required to restore traffic. Progress reports are made periodically, as directed, until repairs are completed and the line is open for train movement.

**EQUIPMENT MAINTENANCE REPORTS**

2-34. Equipment maintenance reports, made by the transportation equipment maintenance company, include the daily enginehouse reports. The equipment maintenance reports show the following:

- Available motive power.
- Number of locomotives undergoing repairs.
- Estimated time when each will be ready for service.

Reports include information about any new motive power placed in service and the fuel situation. Car reports give the number of cars repaired, the number of cars awaiting repairs, and the car numbers of loaded cars. Reports of wrecked cars and locomotives should include the extent of the damage. Prepare other equipment reports in the format and frequency prescribed by higher HQ.



Type of conveyance. Check proper block (rail, barge, or truck).

To: Indicate destination of form.

From: Self-explanatory.

#### Inbound

a. Installation Designation and Location. Self-explanatory.

b. Service and Class. Enter primary class of supplies.

c. On Hand Start Period. Enter number of in-bound freight cars on hand.

d. Received. Enter number of freight cars received during unloading.

e. Quantity Units. Enter number of freight cars unloaded during time period.

f. Quantity Tons. Enter tonnage unloaded during time period.

g. Auth. Indicate consignee.

h. Reconsigned. Enter the number of cars that have changed their original destination or consignee.

i. through l. On Hand End of Period. Indicate the number of cars that have been at your location for 24 hours or less; over 24 hours; or over 48 hours. Show total of cars in block l.

m. Awaiting Placement. Indicate number of cars awaiting placement instructions from consignee.

#### Outbound.

n. through t. Follow instructions for b through l above.

#### Empties.

u. Required. Indicate projected need for out-bound loads for next time period.

v. Available. Indicate number of empties available for outbound load.

w. Remarks. Enter any additional comments.

24-Hour Period Ending. Enter time period ended and date.

Typed Name, Grade, and Title of Person Authenticating Report. Self-explanatory.

Signature. Self-explanatory.

**Figure 2-2. Sample DA Form 5620-R (continued)**

## CAR LABELS AND PLACARDS

2-35. Use car labels and placards to ensure proper handling of certain types of shipments. They also inform yard personnel, inspectors, and switching and train crews of a car's contents. Affix labels or placards in conspicuous or prescribed places to either both sides of a car or the end of a car. In overseas theaters, labels and placards are usually multilingual and are used as prescribed by theater SOPs.

### Urgent-Expedite Labels

2-36. Use these labels for priority shipments only. They inform rail personnel of the shipment's importance so that it is expedited through yards and junctions.

### General Car Labels

2-37. These labels usually have a colored stripe through the middle. They inform railway personnel at a glance what type of commodity or supplies the car contains. They also help local personnel who cannot read English to quickly identify shipments by color association. These labels also give general information such as contents, weight, consignor, consignee, seal numbers (if used), and so forth. The consignor places car labels on both sides of the car. Figure 2-3 shows examples of car labels used by railroads in Europe.



Figure 2-3. Examples of Warning Signs as Railway Car Placards, USAREUR

**Re-icing Placards**

2-38. Use these placards only on refrigerator cars carrying perishable items. Place these placards at eye-level on both sides of the car and near the ice bunkers. These placards show when ice and salt (date and time) were placed in the bunkers at origin and include instructions on any re-icing en route.

**Special Placards**

2-39. Special placards (Figure 2-4, page 2-16) indicate requirements for special handling, easy coupling, and so forth. These placards identify the following:

- Explosives.
- Flammable articles.
- Fragile or perishable cargo.
- Missile components.
- Radioactive materials.
- Any other potentially hazardous items.

Such placards include DO NOT HUMP instructions if applicable. These special placards are usually printed in various color schemes to emphasize their meaning and importance. The consignor or loading activity affixes these placards to each side (or end) of a car before the car is released to the railway service for movement.

**Standard NATO NBC Markers**

2-40. Place standard NATO NBC markers (Figure 2-5, page 2-17) on both sides of railroad rolling stock to indicate contamination. Railroad personnel will take appropriate actions to separate rolling stock for decontamination.

**FORECAST MOVEMENT REQUIREMENTS**

2-41. When operating within the territories of NATO nations of continental Europe, American forces must submit forecast movement requirements, including movement requirements based on contingency plans or wartime needs, to the nations concerned in such movement. The standard format used in forecasting movements is shown in AMovP3.



Figure 2-4. Special Placards



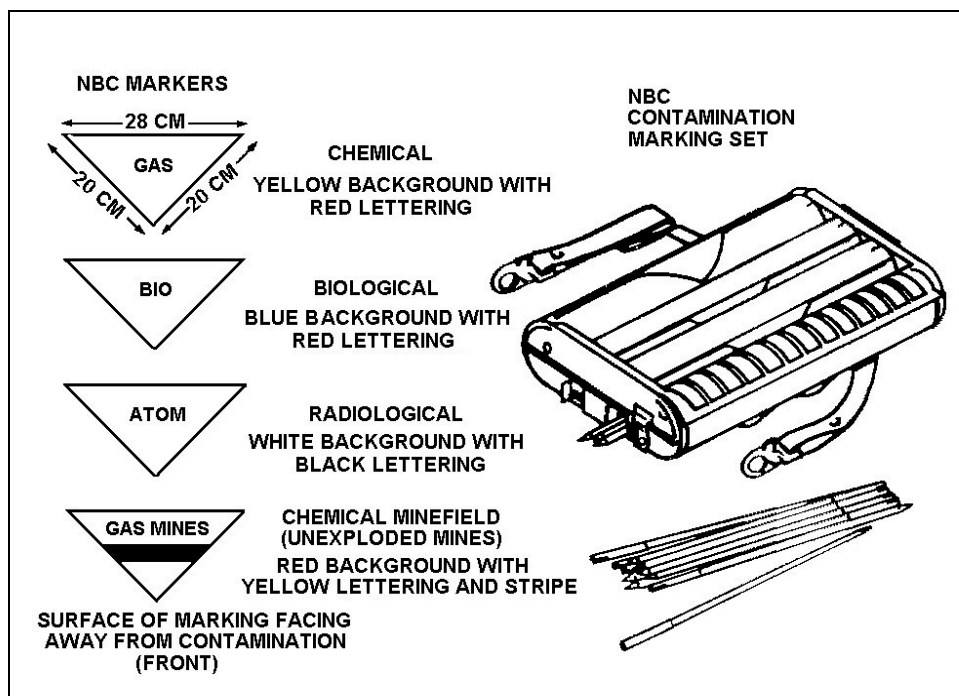


Figure 2-5. NBC Marking Devices

## PORTS

2-42. Close coordination is required between rail unit personnel serving ports and port operating personnel. A large percentage of the tonnage from a port is moved by rail. The smooth operation of a port depends on prompt cargo clearance from the port area. The railway yardmaster must attend the port operations, meeting daily to coordinate the receipt and disposition of cargo that has been designated by the MCT to move from the port area by rail.

## PORT CLEARANCE

2-43. Port capacity depends on prompt movement of cargo from the port area. Since depots, dumps, and storage areas are located within a 20- to 25-mile radius of the ports, MCTs do not designate rail as the best mode to accomplish port clearance for short distances. Railways are characterized by their capability to move large tonnages over long distances. Movements personnel coordinate rail movements with the shipper, the receiver, and railway operating personnel. Coordination will expedite port clearance and prevent congestion at yards and/or terminals at origin and destination. Coordination ensures that rail equipment is placed at the desired location, promptly loaded or unloaded, and promptly released to railway operating personnel. Special coordination with all interested agencies is required when ammunition or dangerous commodities are handled.

### **CAR INSPECTION AND REPAIR FACILITIES**

2-44. Local maintenance facilities may be established when the number of cars used in shuttle service between ports and depots or dumps justifies such action. Car inspectors and maintenance personnel from a car repair platoon, transportation railway equipment maintenance company are stationed in the port area. They perform the following:

- Inspect cars for mechanical defects.
- Make minor repairs (such as replacing airhoses or brakeshoes).
- Repair door fastenings, brake rigging, couplers, and so forth.

Inspectors inspect loaded cars, particularly those containing dangerous commodities, to ensure compliance with clearance requirements and safe loading regulations. Promptly report cars with defective loads to the yardmaster.

### **BORDER CROSSINGS**

2-45. When operating within territories of NATO nations of continental Europe, American forces must be prepared for crossing international borders and border crossing requirements. The format used by movement agencies responsible for relaying information at border crossing points is shown in AMovP2.